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NINE MILE POINT
NUCLEAR STATION

June 30, 2011

U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

ATTENTION: Document Control Desk

SUBJECT: Nine Mile Point Nuclear Station
Unit No. 1; Docket No. 50-220

Licensee Event Report 2011-001, Turbine Trip Due to Oil Pressure Fluctuations to the Turbine Master Trip Solenoid

In accordance with 10 CFR 50.73(a)(2)(iv)(A), please find attached Licensee Event Report 2011-001, Turbine Trip Due to Oil Pressure Fluctuations to the Turbine Master Trip Solenoid.

There are no regulatory commitments in this submittal.

Should you have questions regarding the information in this submittal, please contact John J. Dosa, Director Licensing, at (315) 349-5219.

Very truly yours,

TAL/RJC

Attachment: Licensee Event Report 2011-001, Turbine Trip Due to Oil Pressure Fluctuations to the Turbine Master Trip Solenoid

cc: NRC Project Manager
NRC Resident Inspector
NRC Regional Administrator

ATTACHMENT

LICENSEE EVENT REPORT 2011-001

TURBINE TRIP DUE TO OIL PRESSURE FLUCTUATIONS TO THE TURBINE MASTER TRIP SOLENOID

Nine Mile Point Nuclear Station, LLC
June 30, 2011

NRC FORM 366 (10-2010) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB: NO. 3150-0104 EXPIRES: 10/31/2013

Estimated burden per response to comply with this mandatory collection request: 80 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the FOIA/Privacy Section (T-5 F53), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to infocollects@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

LICENSEE EVENT REPORT (LER)

(See reverse for required number of digits/characters for each block)

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4. TITLE

Turbine Trip Due to Oil Pressure Fluctuations to the Turbine Master Trip Solenoid

5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO.	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
									None	NA
05	02	2011	2011	001	00	06	30	2011	FACILITY NAME: None	DOCKET NUMBER: NA

9. OPERATING MODE

NA

10. POWER LEVEL

47%

11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR§: *(Check all that apply)*

- ☐ 20.2201(b)
- ☐ 20.2201(d)
- ☐ 20.2203(a)(1)
- ☐ 20.2203(a)(2)(i)
- ☐ 20.2203(a)(2)(ii)
- ☐ 20.2203(a)(2)(iii)
- ☐ 20.2203(a)(2)(iv)
- ☐ 20.2203(a)(2)(v)
- ☐ 20.2203(a)(2)(vi)
- ☐ 20.2203(a)(3)(i)
- ☐ 20.2203(a)(3)(ii)
- ☐ 20.2203(a)(4)
- ☐ 50.36(c)(1)(i)(A)
- ☐ 50.36(c)(1)(ii)(A)
- ☐ 50.36(c)(2)
- ☐ 50.46(a)(3)(ii)
- ☐ 50.73(a)(2)(i)(A)
- ☐ 50.73(a)(2)(i)(B)
- ☐ 50.73(a)(2)(i)(C)
- ☐ 50.73(a)(2)(ii)(A)
- ☐ 50.73(a)(2)(ii)(B)
- ☐ 50.73(a)(2)(iii)
- ☒ 50.73(a)(2)(iv)(A)
- ☐ 50.73(a)(2)(v)(A)
- ☐ 50.73(a)(2)(v)(B)
- ☐ 50.73(a)(2)(v)(C)
- ☐ 50.73(a)(2)(v)(D)
- ☐ 50.73(a)(2)(vii)
- ☐ 50.73(a)(2)(viii)(A)
- ☐ 50.73(a)(2)(viii)(B)
- ☐ 50.73(a)(2)(ix)(A)
- ☐ 50.73(a)(2)(x)
- ☐ 73.71(a)(4)
- ☐ 73.71(a)(5)
- ☐ OTHER

Specify in Abstract below or in NRC Form 366A

12. LICENSEE CONTACT FOR THIS LER

NAME	TELEPHONE NUMBER (Include Area Code)
John Dosa, Director Licensing	(315) 349-5219

13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT

CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX
A	TB	180x274	GE	Y	N/A	N/A	N/A	N/A	N/A

14. SUPPLEMENTAL REPORT EXPECTED

☐ YES *(If yes, complete 15. EXPECTED SUBMISSION DATE)* ☒ NO

15. EXPECTED SUBMISSION DATE

MONTH	DAY	YEAR
NA	NA	NA

ABSTRACT *(Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)*

At 2051 on May 2, 2011, Nine Mile Point Unit 1 (NMP1) experienced a turbine trip while operating at approximately 47 percent power (867 MWth). The main turbine master trip solenoid (MTS) actuated due to oil pressure fluctuations that allowed the pressure to drop below the MTS trip setpoint. These fluctuations were caused by leaking fittings on the MTS oil supply lines, binding of the secondary speed relay linkage, and main shaft oil pump discharge pressure fluctuations. The turbine trip initiated the high pressure coolant injection (HPCI) system as designed. The scram caused a drop in the reactor pressure vessel (RPV) water level that was mitigated by the HPCI injection. At 2052, RPV water level was restored above the HPCI low level actuation setpoint and the HPCI system initiation signal was reset.

The root cause of the event was inadequate implementation of management job performance standards which resulted in the development and implementation of work performance documents which lacked sufficient detail associated with turbine maintenance activities.

The immediate corrective action was to repair the turbine exciter/generator Falk coupling installation, replace the tubing and connections to the MTS supply lines, repair the secondary speed relay linkage, and repair the gears to the main shaft oil pump. Procedures will be developed to detail the disassembly, inspection, reassembly and testing of the NMP1 turbine, generator, exciter and control components.

There have been no similar LERs at NMP1.

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I. DESCRIPTION OF EVENT

A. PRE-EVENT PLANT CONDITIONS:

Prior to this event, Nine Mile Point Unit 1 (NMP1) was operating and stable at 47 percent power with no inoperable systems affecting this event. The unit was at 47 percent power in order to investigate unusual vibrations on the turbine shaft driven feedwater pump and generator.

B. EVENT:

At 2051 on May 2, 2011, NMP1 experienced a turbine trip while operating at approximately 47 percent power (867 MWth). The main turbine master trip solenoid (MTS) actuated due to oil pressure fluctuations that allowed the pressure to drop below the MTS trip setpoint. These fluctuations were caused by leaking fittings on the MTS oil supply lines, binding of the secondary speed relay linkage, and main shaft oil pump discharge pressure fluctuations. The main shaft oil pump discharge pressure fluctuations were due to gear pitting on the main oil pump shaft gear interface to the turbine. The gear pitting was caused by circulating current through the turbine generator shaft as a result of a shorted Falk insulating coupling. The turbine trip caused an automatic reactor scram actuated by the reactor protection system (RPS) on the turbine stop valve close signal. All control rods fully inserted as required. The turbine trip initiated the high pressure coolant injection (HPCI) system as designed. The scram caused a drop in the reactor pressure vessel (RPV) water level that was mitigated by the HPCI injection. At 2052, RPV water level was restored above the HPCI low level actuation setpoint and the HPCI system initiation signal was reset. After the reactor scram and turbine trip, the turbine bypass valves operated properly to control reactor pressure.

The HPCI system actuation on a turbine trip signal is per design. At NMP1, the HPCI system is an operating mode of the feedwater system and is not an Emergency Core Cooling System (ECCS).

There was no impact on Nine Mile Point Unit 2 (NMP2) from this event.

This event involved the automatic actuation of the Reactor Protection System (RPS), which resulted in a reactor scram and the automatic initiation of the HPCI system due to the turbine trip. The notifications per 10 CFR 50.72(b)(2)(iv)(B) for RPS actuation and 10 CFR 50.72(b)(3)(iv)(A) for HPCI actuation were completed on May 2, 2011 at 2255.

C. INOPERABLE STRUCTURES, COMPONENTS, OR SYSTEMS THAT CONTRIBUTED TO THE EVENT:

There were no inoperable components or systems that contributed to this event.

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D. DATES AND APPROXIMATE TIMES OF MAJOR OCCURRENCES:

April 26, 2011:

0337 Thermal power was reduced at NMP1 to approximately 43 percent due to elevated vibrations on the turbine shaft driven feedwater pump gear box and generator.

April 26 through May 2, 2011:

Investigations continued to determine the cause of the vibrations on the turbine shaft driven feedwater pump gear box and generator.

May 2, 2011:

1805 NMP1 was operating at approximately 45 percent power due to shaft driven feedwater pump gearbox maintenance.

2051 The reactor scrammed from 47 percent power on an automatic initiation of the RPS logic. The HPCI system automatically initiated on a turbine trip signal.

2052 RPV level was restored to above the HPCI system low level actuation setpoint and the HPCI system initiation signal was reset.

May 3, 2011:

0310 NMP1 was in cold shutdown.

May 19, 2011:

Repairs to the NMP1 turbine generator were completed and the unit was restored to 100 percent power.

E. OTHER SYSTEMS OR SECONDARY FUNCTIONS AFFECTED:

The HPCI system was initiated on a turbine trip signal. The HPCI system is an operating mode of the feedwater system. The HPCI system is not an ECCS.

F. METHOD OF DISCOVERY:

This event was discovered by the operators when the reactor automatically scrammed.

G. MAJOR OPERATOR ACTION:

Upon discovery of the reactor scram, the operators verified all rods were fully inserted. No other actions were required to support shutting down the reactor.

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H. SAFETY SYSTEM RESPONSES:

All safety systems responded per design. There was no loss of offsite power to the onsite emergency buses, the HPCI system initiated as designed, and the ECCS systems were available but not called upon to support the safe shutdown of the reactor.

II. CAUSE OF THE EVENT:

The cause of the event falls under NUREG-1022 cause code A (personnel error). Inadequate implementation of management job performance standards resulted in the development and implementation of work performance documents which lacked sufficient detail associated with turbine maintenance activities. An over-reliance on the original equipment manufacturer to prescribe the routine maintenance activities, as well as the level of detail within the work documents and the use of skill-of-the-trade activities for supplemental personnel, resulted in degraded equipment conditions and poor maintenance practices.

In the spring 2011, the NMP1 turbine exciter was disassembled and reinstalled by the manufacturer. In the course of reinstallation, a Falk insulating coupling between the exciter and generator was installed with a locking tab in contact with the generator shaft. With the locking tab in contact with the generator shaft the insulating properties of the coupling were bypassed. This short caused circulating currents resulting in changes to the shaft driven oil pump gears which caused oil pressure fluctuations to occur. Also during reinstallation, the fittings on the MTS supply lines were damaged which resulted in oil leaks around these fittings. These leaks contributed to the oil pressure fluctuations. Contributing to these errors was a pre-existing condition of control linkage binding on the secondary speed relay. This linkage had been visually inspected, but due to lack of specific inspection criteria, the binding was not noted. The combination of the leaking fittings on the MTS oil supply, the binding of the secondary speed relay linkage, and main shaft oil pump discharge pressure fluctuations caused the oil pressure to the MTS to fluctuate enough to cause it to actuate and trip the turbine. The turbine tripped on MTS actuation leading to an automatic RPS reactor scram. The cause of the MTS actuation was oil pressure fluctuations to the MTS.

This event was entered into the Nine Mile Point corrective action program (Condition Report 2011-004459).

III. ANALYSIS OF THE EVENT:

This event is reportable in accordance with 10 CFR 50.73(a)(2)(iv)(A) as an event or condition that resulted in manual or automatic actuation of any of the systems listed in paragraph 10 CFR 50.73(a)(2)(iv)(B). Both the RPS and HPCI system (an operating mode of the feedwater system) were actuated during this event. Both systems are listed in 10 CFR 50.73(a)(2)(iv)(B).

At NMP1, the HPCI system is an operating mode of the feedwater system. The HPCI system functions as a feedwater coolant injection system and is not an ECCS. Plant systems performed per design. Plant parameters, other than reactor water level, remained within normal values throughout the event. There was no loss of offsite power to the emergency buses, HPCI initiated as designed, and the ECCS systems were available, but not called upon to support the safe shutdown of the reactor. Had this event occurred at higher power, with or without the turbine shaft driven feedwater pump, the results would have been the same. The reactor would still have scrammed with reactor pressure vessel water level shrinkage and HPCI initiation.

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It is therefore concluded that had a design basis accident occurred coincident with this event, even at higher power, plant systems would have responded per design to mitigate the accident. Based on the above considerations, the safety significance of this event is very low, and the event did not pose a threat to the health and safety of the public or plant personnel. This event affects the NRC regulatory oversight process (ROP) index for unplanned scrams. Due to this scram, the unplanned scram index value will be 1.83 compared to the green-to-white threshold value of greater than three. This reduction will not result in entry into the "increased regulatory (white) response band."

IV. CORRECTIVE ACTIONS:

A. ACTION TAKEN TO RETURN AFFECTED SYSTEMS TO PRE-EVENT NORMAL STATUS:

1. The Falk coupling locking tabs were replaced and the insulation value was verified.
2. The tubing and damaged fittings associated with the master trip solenoid supply lines were repaired.
3. The secondary speed relay linkage was adjusted so it does not bind.
4. The shaft driven oil pump gears were repaired.
5. The repairs to the NMP1 turbine were completed and the unit was restored to 100 percent power.

B. ACTION TAKEN OR PLANNED TO PREVENT RECURRENCE:

1. Additional Nine Mile Point Nuclear Station oversight and supervision was present to oversee the repairs.
2. Procedures will be developed to detail the disassembly, inspection, reassembly and testing of the NMP1 turbine, generator, exciter and control components.

V. ADDITIONAL INFORMATION:

A. FAILED COMPONENTS:

The following components failed:
1. The turbine generator/exciter Falk coupling was shorted.
2. The shaft driven oil pump gears were damaged due to the circulating current.
3. The secondary speed sensing linkage was binding.
4. The tubing/fittings on the supply lines to the MTS were damaged and leaking oil.

B. PREVIOUS LERS ON SIMILAR EVENTS:

There are no previous LERs related to pressure fluctuations on the MTS or binding on the secondary speed sensing relay.

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C. THE ENERGY INDUSTRY IDENTIFICATION SYSTEM (EIIS) COMPONENT FUNCTION IDENTIFIER AND SYSTEM NAME OF EACH COMPONENT OR SYSTEM REFERRED TO IN THIS LER:

COMPONENT	IEEE 803 COMPONENT IDENTIFIER	IEEE 805 SYSTEM IDENTIFICATION	PART NUMBER
HPCI Pump	P	BJ	
Master Trip Solenoid	SOL	TA	
Turbine Bypass Valves	V	JI	
Feedwater Pump	P	SJ	
Main Generator System	TG	TB	180 X 274
Reactor Protection System	NA	JC	

D. SPECIAL COMMENTS:

None